An Argument for Output Conditions[1]

Shimizu, Shinichi

0. Convincing arguments for output conditions in the framework of transformational grammar were put forward in Perlmutter (1968) for the first time. In this paper, another cogent argument for output conditions will be presented in conjunction with the problem involved in the application of *Right Node Raising* (henceforth *RNR*). In particular, various investigations on *RNR* applied to verb phrases will be made, seeking for constraints on applicability of *RNR*.

In 1, general properties of *RNR* outlined mainly by Hankamer (1971) will be more minutely examined, and in 2 it will be pointed out that his statement of the raising from a verb phrase is inappropriate. In 3, a relative ordering of rules will be examined so that the all and only well-formed sentences applied by the rule referring to verb phrases can be generated. Failure of the rule ordering motivates a new transformation of *Be Shift*. In this connection, Akmajian and Wasow (1974) will be surveyed to introduce *Be Shift* into grammar. Since conditions on the derivation of sentences may be described in terms of transformational rules or phrase structure rules in base component, we will make an investigation in this section in the following way.

(0.1) The relative ordering of rules including an additional transformation of *Be Shift* will be examined, and

(0.2) some phrase structure rules are slightly modified as well.

In 4, approaches in terms of (0.1) and (0.2) will be refused by proper evidence, and then motivation for well-formedness conditions on the output of the transformational component will be revealed, and in 5 the output conditions will be formulated so that unacceptable strings produced by the application of *RNR* can be "filtered out" on the surface structure level.

1. *RNR and its properties*

Restrictions on *RNR* are clarified in this section. Hankamer (1971) points out some restrictions on *RNR*:

(1.1) a. *RNR* reduces only a final constituent of the conjoined sentences.
b. The restriction does not work on more than one constituent.
c. *RNR* can reduce a final constituent of a verb phrase (henceforth VP), no matter how deeply embedded, but not the VP itself of an embedded clause.

Taking the first two restrictions into consideration, *RNR* is defined as the rule by which Chomsky-adjoins a copy of the "final" identical constituents in each conjunct to the right of the coordinate node, and then deletes the original constituents. Thus (1.2.a) is converted into (1.2.b) by the application of *RNR* (1.3).

(1.2) a. Jack may be a werewolf and Tony certainly is a werewolf.
b. Jack may be, and Tony certainly is, a werewolf.

(1.3) *RNR* (optional)

$X\ A_i\ Y\ A_i$

SD: 1 2 3 4 $\longrightarrow$

SC: $[1\ \phi\ 3\ \phi]\ \#4$

There is an extremely sharp intonational break between the raised material and the original elements.

RNR can raise a final constituent alone. Observe the following.

(1.4) a. *Jack bought from Melvin a book.
b. Jack bought from Melvin, a book which taught him organic knitting. (Postal 1974: 1)
c. *Jack bought from Melvin, and Bill gave to Mary, a book.
d. Jack bought from Melvin, and Bill gave to Mary, a book which taught him organic knitting.

*(1.4.a) and (1.4.b) show that a "heavy" (that is, roughly, long and/or clause-containing) NP is moved from its normal position to the right of the end of its immediately containing clause. Postal (1974) refers to the rule dealing with this phenomenon as *Complex NP Shift*. In (1.4.d), the structure before the

application of *RNR* has *a book which taught him organic knitting* at the final position in each conjunct, whereas, in *(1.4.c), the structure before tha application of *RNR* does not have *a book* at the final position in each conjunct because of failure of the application of *Complex NP Shift*; therefore, (1.4.d) constitutes a decisive evidence indicating that *RNR* can raise a final constituent alone.(2)

Let us examine what kind of "single" final constituents can be raised. Observe the following.(3)

(1.5) a. "We later found out she bought an apartment house with our quarters and nickels and dimes," marvels the security man who eventually caught and cashiered, the cashier.

(NW, Nov. 25 1975, p. 46) (4)

b. The government would deliver social welfare benefits in exchange for voluntary restraints in pay settlement. Purpose: to keep workers abreast of, but not ahead of, inflation.

(TM, July 14 1975, p. 16)

c. The Rockfeller Commission on the CIA suggested, and many congressmen concur, that the CIA should have a second deputy director who would devote himself solely to guarding against improper activities. (NW, Nov. 17 1975, p. 44)

d. To help celebrate Tatum O'Neal's twelfth birthday, Andy Warhol took the child actress, and his ever-present tape recorder, on a tour of Seventh Avenue fashion showrooms in New York. (NW, Dec. 8 1975, p. 50)

e. . . . He listened, or did not listen, to the proceeding taking place around him. (LF. Oct. 3 1969)

f. Terry used to be, and George still is, very suspicious.

(Postal 1974: 126)

g. I must confess that I find this reaction, and even more, the powerful political clamor against prosecution which preceded the dropping of charges, disturbing.

(LF, Oct. 17 1969)

h. Buying a pack of joints at the corner grocery may still be years, or decades, away.

(TM, July 7 1975, p. 20)

i. Kennedy's regained spirit appears to come from acceptance of the fact that he must, and will, face further questioning.

(LF, Oct. 3 1969)

j. They can, and do, disrupt currency markets by shifting huge sums from, say, dollars into Deutsche Marks.

(TM, July 14 1975, p. 54)

(1.5) indicates that the raised materials are NP (from (1.5.a) and (1.5.b)), S (from (1.5.c)), PP (from (1.5.d) and (1.5.e)), AP (from (1.5.f) and (1.5.g)), ADV (from (1.5.h)), and VP (from (1.5.i) and (1.5.j)). Notice that all the raised materials are major constituents. As a result of observation on the examples of (1.5), *RNR* raises any "single" major constituents.

2. *Problem*

It follows from (1.5.i) that (1.1.c) does not remain valid. Let us further clarify this point. Observe the following.

(2.1) a. John tried to force Harry to admit that Sally was, and Albert succeeded in proving to Seymour that Kathy had once been, a witch.

b. *John tried to force Harry to admit that Sally, and Albert succeeded in proving to Seymour that Kathy, was a witch.

The generation of *(2.1.b) is blocked by the restriction (1.1.c) on *RNR*. What (1.1.c) actually means is that *RNR* does not operate on the VP itself of an embedded clause. This, however, is cancelled out by the following.

(2.2) a. Tom said he would, and Bill actually did, eat a raw eggplant.

(Postal 1974: 126)

b. George will, and I believe that Bob might, take the course.

(Quirk 1972, p. 585)

c. John suspected that Kathy might have, but Albert succeeded in proving that Sally had, stolen the ring.

From the examples above, it is obvious that *RNR* operates on a VP, regardless of whether it is embedded or not. Then the problem is how to account for *(2.1.b), (2.2.a), (2.2.b), and (2.2.c). In what follows, an attempt to explain those examples in terms of rule ordering is made. The next part of this paper is mainly concerned with how the rules, *Passivization, Be Shift, En/Ing Hopping, RNR*, and *Tense Hopping* interact to yield the all and only well-formed sentences.

3. *Solution in terms of rule ordering*

RNR which refers to a VP constituent raises the same VP that *VP Deletion* refers to. It may fairly be presumed that a relative ordering of *RNR*, *VP Deletion*, and the relevant rules is illustrated as follows.

(3.1)

R_1
⋮
R_i
R_{i+1}
Ordered ↓ *VP Deletion/RNR*
R_{i+3}
R_{i+4}
⋮
R_n

Before a rigid investigation of interaction of *RNR* with R_i and R_n, we will see that of *VP Deletion* with the rest of them. To solve the problem posited in 2, it is necessary that *Affix Hopping* should be broken down into two distinct rules, namely, *En/Ing Hopping* and *Tense Hopping*. In addition to this, *Be Shift* is required to solve the problem. Akmajian and Wasow (1974) will first be surveyed through association with introduction of a new transformational rule of *Be Shift*, and an amicable solution will secondly be offered.

3.1 Akmajian and Wasow

3.1.1 With differentiation of *Affix Hopping*, they argue about interaction of three rules, *En/Ing Hopping*, *Tense Hopping*, and *Be Shift* with *VP Deletion* which deletes an identical VP forwardly. Consider the following.

(3.2) a. John Dean was crying in court, and James McCord was, too.
b. The CIA guards our freedoms, and the FBI does, too.

Let us see the derivational process of (3.2.a) and (3.2.b) under a working hypothesis that *Affix Hopping* is a single rule. The structure underlying (3.2.a) is roughly represented in (3.3.a).

(3.3) a. $[_S\ [_S$ John Dean $[_{AUX}$ Past be-ing] $[_{VP}$ cry in court] $_S]$ and $[_S$ James McCord $[_{AUX}$ Past be-ing] $[_{VP}$ cry in court] too $_S]$ $_S]$

$\Downarrow$ *Affix Hopping*

b. $[_S\ [_S$ John Dean $[_{AUX}$ be + Past] $[_{VP}$ cry + ing in court] $_S]$ and $[_S$ James McCord $[_{AUX}$ be + Past] $[_{VP}$ cry + ing in court] too $_S]$ $_S]$

$\Downarrow$ *VP Deletion*

c. $[_S\ [_S$ John Dean $[_{AUX}$ be + Past] $[_{VP}$ cry + ing in court] $_S]$ and $[_S$ James McCord $[_{AUX}$ be + Past] too $_S]$ $_S]$

The rule ordering thus should be like (3.4) in order to derive (3.2.a).

(3.4) *Affix Hopping* ⇨ *VP Deletion*

To derive (3.2.b), however, the rule ordering has to be reversed.(5)

To get rid of the rule ordering paradox, *Affix Hopping* must be divided into two distinct rules *En/Ing Hopping* and *Tense Hopping*, and the rules must be ordered as follows.

(3.5) *En/Ing Hopping* ⇨ *VP Deletion* ⇨ *Tense Hopping*

Given the rule ordering (3.5), both (3.2.a) and (3.2.b) are derived without any rule ordering paradox. With this in mind, let us re-examine both of the derivational processes. (3.6.a) is a rough underlying structure of (3.2.a).

(3.6) a. $[_S\ [_S$ John Dean $[_{AUX}$ Past be-ing] $[_{VP}$ cry in court] $_S]$ and $[_S$ James McCord $[_{AUX}$ Past be-ing] $[_{VP}$ cry in court] too $_S]$ $_S]$

$\Vert$ *En/Ing Hopping*

⇩

b. $[_S [_S$ John Dean $[_{AUX}$ Past be] $[_{VP}$ cry + ing in court] $_S]$ and $[_S$ James McCord $[_{AUX}$ Past be] $[_{VP}$ cry + ing in court] too $_S]$ $_S]$

||

VP Deletion

⇩

c. $[_S [_S$ John Dean $[_{AUX}$ Past be] $[_{VP}$ cry + ing in court] $_S]$ and $[_S$ James McCord $[_{AUX}$ Past be] too $_S]$ $_S]$

||

Tense Hopping

⇩

d. $[_S [_S$ John Dean $[_{AUX}$ be + Past] $[_{VP}$ cry + ing in court] $_S]$ and $[_S$ James McCord $[_{AUX}$ be + Past] too $_S]$ $_S]$

(3.5) successfully derives (3.2.a).

The structure underlying (3.2.b) is roughly represented in (3.7.a).

(3.7) a. $[_S [_S$ the CIA $[_{AUX}$ Pres] $[_{VP}$ guard our freedoms] $_S]$ and $[_S$ the FBI $[_{AUX}$ Pres $[_{VP}$ guard our freedoms] too $_S]$ $_S]$

Since there is no En/Ing affix in both conjuncts of (3.7.a), *VP Deletion* first applies to (3.7.a). The derived structure is (3.7.b).

(3.7) b. $[_S [_S$ the CIA $[_{AUX}$ Pres] $[_{VP}$ guard our freedoms] $_S]$ and $[_S$ the FBI $[_{AUX}$ Pres] too $_S]$ $_S]$

Since at the stage of the application of *Tense Hopping* there is nothing for Tense in the right conjunct to be attached to, *Do Support* applies to (3.7.b) after *Tense Hopping*. The resultant derived structure is (3.2.b). From both of the derivational processes (3.5) turns out to be valid.

There is another argument for differentiation of *Affix Hopping*. Let us consider how the rule ordering (3.8) works out in the derivational process of (3.9)

(3.8) *There Insertion* ⇨ *Affix Hopping* (as a single rule)

(3.9) There are many people dancing in the fields.

The structure underlying (3.9) is roughly represented in (3.10.a).

(3.10) a. [$_S$ [$_{NP}$ many people] [$_{AUX}$ Pres be-ing] [$_{VP}$ dance in the fields] $_S$]

||

There Insertion

⇩

b. [$_S$ [$_{NP}$ there] [$_{AUX}$ Pres be [$_{NP}$ many people] in] [$_{VP}$ dance in the fields] $_S$]

||

Affix Hopping

⇩

c. [$_S$ [$_{NP}$ there] [$_{AUX}$ be + Pres [$_{NP}$ many people]] [$_{VP}$ dance + ing in the field] $_S$]

Notice that in (3.10.c) the NP, *many people*, is dominated by AUX.

There is another possible rule ordering for the derivation of (3.9), which is (3.11).

(3.11) *En/Ing Hopping* ⇨ *There Insertion* ⇨ *Tense Hopping*

Suppose that (3.12.a) is the structure after the application of *En/Ing Hopping* to (3.10.a). The derivational process by (3.11) is as follows.

(3.12) a. [$_S$ [$_{NP}$ many people] [$_{AUX}$ Pres be] [$_{VP}$ dance + ing in the field] $_S$]

||

There Insertion

⇩

b. [$_S$ [$_{NP}$ there] [$_{AUX}$ Pres be] [$_{VP_1}$ [$_{NP}$ many people] [$_{VP}$ dance + ing in the fields $_{VP}$] $_{VP_1}$] $_S$]

||

Tense Hopping

⇩

c. [$_S$ [$_{NP}$ there] [$_{AUX}$ be + Pres] $_{VP_1}$] [$_{NP}$ many people] [$_{VP}$ dance + ing in the fields $_{VP}$] $_{VP_1}$] $_S$]

Notice that in (3.12.b) the NP, *many people*, is dominated by VP1.

Now the problem is which rule ordering predicts a correct derivation, (3.8) or (3.11). It follows from (3.13) that (3.11) is correct.

(3.13) John said that there wouldn't be many people dancing in the fields, but there are.

The structure before the application of *VP Deletion* is (3.14), which happens to be the output structure of *There Insertion*.

(3.14) John said that there wouldn't be many people dancing in the fields, but there are $[_{VP}$ many people dancing in the fields $_{VP}]$

It must be remembered that before the application of *VP Deletion*, a constituent, *many people dancing in the fields*, has to be a single constituent of VP. As is shown in (3.12.b) in which the NP, *many people*, is dominated by VP1, the rule ordering (3.11) provides a more appropriate input structure to (3.13) than (3.8) does. In consequence of the above, the relative ordering of the rules concerned is as follows.

(3.15) *En/Ing Hopping* ⇨ *There Insertion* ⇨ *VP Deletion* ⇨ *Tense Hopping* ⇨ *Do Support*

3.1.2 *Be Shift*

This section is concerned with what motivates an introduction of *Be Shift* into grammar. Consider the following.

(3.16) There many people being examined by the doctor.

Let us examine how the rule ordering (3.15) works out in the derivational process of (3.16). The structure underlying (3.16) is roughly represented in (3.17.a).

(3.17) a. $[_S$ $[_{NP}$ the doctor] $[_{AUX}$ Pres be-ing] $[_{VP}$ examine many people] $_S]$

||

Passivization

⇩

b. $[_S$ $[_{NP}$ many people] $[_{AUX}$ Pres be-ing be-en] $[_{VP}$ examine $[_{NP}$ by $[_{NP}$ the doctor $_{NP}]$ $_{NP}]$ $_{VP}]$ $_S]$

||

En/Ing Hopping

⇩

c. [$_{S}$ [$_{NP}$ many people] [$_{AUX}$ Pres be be + ing] [$_{VP}$ examine + en [$_{NP}$ by [$_{NP}$ the doctor $_{NP}$] $_{NP}$] $_{NP}$] $_{S}$]

||

There Insertion

⇩

d. [$_{S}$ [$_{NP}$ there [$_{AUX}$ Pres be be + ing]· [$_{VP}$ [$_{NP}$ many people $_{NP}$] examine + en by the doctor $_{VP}$] $_{S}$]

The application of *Tense Hopping* to (3.17.d) results in *(3.18) which is ungrammatical.

(3.18) *There are being many people examined by the doctor.

To avoid deriving the ungrammatical sentence *(3.18), a passive *be-en* may be placed in the initial position of VP. With this in mind, let us re-examine the derivational process of (3.16) by starting off with (3.17.a).

(3.17) a. [$_{S}$ [$_{NP}$ the doctor] [$_{AUX}$ Pres be-ing] [$_{VF}$ examine many people $_{VP}$] $_{S}$]

||

Passivization

⇩

(3.18) a. [$_{S}$ [$_{NP}$ many people] [$_{AUX}$ Pres be-ing] [$_{VP}$ be-en examine by the doctor $_{VP}$] $_{S}$]

||

En/Ing Hopping

⇩

b. [$_{S}$ [$_{NP}$ many people] [$_{AUX}$ Pres be] [$_{VP}$ be + ing examine + en by the doctor $_{VP}$] $_{S}$]

||

There Insertion

⇩

c. [$_{S}$ [$_{NP}$ there] [$_{AUX}$ Pres be] [$_{VP}$ [$_{NP}$ many people $_{NP}$] [be + ing examine + en by the doctor] $_{VP}$] $_{S}$]

The application of *Tense Hopping* to (3.18.c) results in the grammatical sentence (3.16). Notice that (3.16) contains both a progressive *be* and a passive *be*.

Let us consider the example (3.19) which contains only a passive *be*.

(3.19) Nixon was examined by the doctor.

(3.20.a) roughly represents the underlying structure of (3.19). The derivational process is as follows.

(3.20) a. $[_S$ $[_{NP}$ the doctor] $[_{AUX}$ Past] $[_{VP}$ examine Nixon $_{VP}]$ $_S]$

$\|$

Passivization

$\Downarrow$

b. $[_S$ $[_{NP}$ Nixon] $[_{AUX}$ Past] $[_{VP}$ be-en examine by the doctor $_{VP}]$ $_S]$

$\|$

En/Ing Hopping

$\Downarrow$

c. $[_S$ $[_{NP}$ Nixon] $[_{AUX}$ Past] $[_{VP}$ be examine + en by the doctor $_{VP}]$ $_S]$

$\|$

Tense Hopping

$\Downarrow$

d. $[_S$ $[_{NP}$ Nixon] $[_{VP}$ be + Past examine + en by the doctor $_{VP}]$ $_S]$

Next consider (3.21.a) and (3.21.b).

(3.21) a. Ford was examined by the doctor, and Nixon was, too.

b. *Ford was examined by the doctor, and Nixon did, too.

What a pair of (3.21) shows is that in (3.21.a), *VP Deletion* does not delete the VP, *be examined by the doctor*, but *examined by the doctor*; therefore, before the application of *VP Deletion*, *be* must be shifted into AUX. It is observed from the above facts that a passive *be* remains as a part of VP if AUX contains a progressive *be*; otherwise it were incorporated into AUX.

With the above in mind, let us re-examine the derivational processes of (3.19) and (3.21.a). The renewed derivation of (3.19) is as follows.

(3.22) a. $[_S\ [_{NP}$ the doctor] $[_{AUX}$ Past] $[_{VP}$ examine Nixon $_{VP}]\ _S]$
(= (3.20.a))

||

Passivization

⇩

b. $[_S\ [_{NP}$ Nixon $[_{AUX}$ Past] $[_{VP}$ be-en examine by the doctor $_{VP}]\ _S]$
(= (3.20.b))

||

Be Shift

⇩

c. $[_S\ [_{NP}$ Nixon] $[_{AUX}$ Past be] $[_{VP}$ en examine by the doctor $_{VP}]\ _S]$

After the application of *En/Ing Hopping* and *Tense Hopping* successively to (3.22.c), (3.19) is properly derived. Next let us see the renewed derivation of (3.21.a). (3.23.a) roughly represents the structure underlying (3.21.a). The derivational process is as follows.

(3.23) a. $[_S\ [_{NP}$ the doctor] $[_{AUX}$ Past] $[_{VP}$ examine Ford $_{VP}]\ _S]$ and $[_S\ [_{NP}$ the doctor] $[_{AUX}$ Past] $[_{VP}$ examine Nixon $_{VP}]$ too S] S]

||

Passivization

⇩

b. $[_S\ [_S\ [_{NP}$ Ford] $[_{AUX}$ Past] $[_{VP}$ be-en examine by the doctor $_{VP}]\ _S]$ and $[_S\ [_{NP}$ Nixon] $[_{AUX}$ Past] $[_{VP}$ be-en examine by the doctor VP] too S] S]

||

Be Shift

⇩

c. $[_S\ [_S\ [_{NP}$ Ford] $[_{AUX}$ Past be] $[_{VP}$ en examine by the doctor $_{VP}]\ _S]$ and $[_S\ [_{NP}$ Nixon] $[_{AUX}$ Past be] $[_{VP}$ en examine by the doctor $_{VP}]$ too $_S]\ _S]$

$\Vert$

En/Ing Hopping

⇩

d. $[_S\ [_S\ [_{NP}$ Ford$]$ $[_{AUX}$ Past be$]$ $[_{VP}$ examine + en by the doctor $_{VP}]$ $_S]$ and $[_S\ [_{NP}$' Nixon$]$ $[_{AUX}$ Past be$]$ $[_{VP}$ examine + en by the doctor $_{VP}]$ too $_S]$ $_S]$

$\Vert$

VP Deletion

⇩

e. $[_S\ [_S\ [_{NP}$ Ford$]$ $[_{AUX}$ Past be$]$ $[_{VP}$ examine + en by the doctor $_{VP}]$ $_S]$ and $[_S\ [_{NP}$ Nixon$]$ $[_{AUX}$ Past be$]$ too $_S]$ $_S]$

After the application of *Tense Hopping* to (3.23.e), (3.21.a) is to be properly derived. Since *be* has already been shifted into AUX by *Be Shift* as in (3.23.c), there is no opportunity for *Do Support* to apply. Thus *(3.21.b) is not derived due to a rule of *Be Shift*.

3.1.3 Summary

From the above survey, the rule ordering (3.24), the phrase structure rules (3.25), and a transformational rule of *Be Shift* (3.26) are provided as a part of grammar.

(3.24) *Passivization* (where *be-en* is placed at an initial position of VP) ⇨ *Be Shift* ⇨ *En/Ing Hopping* ⇨ *There Insertion* ⇨ *VP Deletion* ⇨ *Tense Hopping* ⇨ *Do Support*

(3.25) AUX $\longrightarrow$ Tense (M) (have-en) (be-ing)

VP $\longrightarrow$ V

(3.26) *Be Shift* (obligatory)

$$\begin{array}{llccll} & \text{X} & \underbrace{\text{Tense (M) (have-en)}} & \text{be} & \text{Y} & \\ \text{SD:} & 1 & 2 & 3 & 4 & \longrightarrow \\ \text{SC:} & 1 & 2+3 & & 4 & \end{array}$$

3.2 Toward a solution of the problem

In this section, a comeback attempt to solve the problem posited in 2 is made on the basis of a cogent argument summarized in 3.1.3.

3.2.1 Interaction of *RNR* with other rules

The problem is how to derive the sentences (2.1.a) and (2.2), and block the derivation of *(2.1.b). As is shown in the previous section, the rule ordering (3.24) stands good. Suppose that *VP Deletion* is replaced by *RNR*. Then how do the rules, *Passivization*, *Be Shift*, *En/Ing Hopping*, *RNR*, and *Tense Hopping* interact as a lucid explanation for those sentences? Can a fixed rule ordering account for them? Observe the following.

(3.27) a. ?*Jack must, and Tony may, be a werewolf.

b. Jack must be, and Tony may be, a werewolf.

c. [$_S$ [$_S$ Jack [$_{AUX}$ must be] [$_{VP}$ a werewolf] $_S$] and [$_S$ Tony [$_{AUX}$ may be] [$_{VP}$ a werewolf] $_S$] $_S$]

In the derivation of (3.27.b), the structure before the application of *RNR* is roughly represented in (3.27.c). (3.27.c) shows that *Be Shift* has already applied before *RNR*. The fact that *Be Shift* applies prior to *RNR* successfully predicts ungrammaticalness of ?*(3.27.a) as well as grammaticalness of (3.27.b).

Now let us consider a relative ordering of *RNR* and *Tense Hopping*. Observe the following again.

(2.2) a. Tom said he would, and Bill actually did, eat a raw eggplant.

b. George will, and I believe that Bob might, take the course.

c. John suspected that Kathy might have, but Albert succeeded in proving that Sally had, stolen the ring.

Take first the derivational process of (2.2.a) for example. The structure underlying (2.2.a) is roughly represented in (3.28.a).

(3.28) a. [$_S$ [$_S$ Tom said [$_S$ he [$_{AUX}$ Past will] [$_{VP}$ eat a raw eggplant] $_S$] $_S$] and [$_S$ Bill actually [$_{AUX}$ Past] [$_{VP}$ eat a raw eggplant] $_S$] $_S$]

If *Tense Hopping* applies prior to *RNR*, identity of the VP's in both conjuncts is lost as in (3.28.b), so that *RNR* can not operate on it.

(3.28) a. [$_S$ [$_S$ Tom said [$_S$ he [$_{AUX}$ will + Past] [$_{VP}$ eat a raw eggplant] $_S$] $_S$] and [S Bill actually [$_{VP}$ eat + Past a raw eggplant] $_S$] $_S$]

But if *RNR* applies to (3.28.a) prior to *Tense Hopping*, (3.28.c) is derived after the application of *RNR*.

(3.28) c. $[_S [_S [_S$ Tom said $[_S$ he $[_{AUX}$ Past will$]$ $_S]$ $_S]$ and $[_S$ Bill actually $[_{AUX}$ Past$]$ $_S]$ $_S]$ $[_{VP}$ eat a raw eggplant$]$ $_S]$

The application of *Tense Hopping* to (3.28.c) yields (3.28.d).

(3.28) d. $[_S [_S [_S$ Tom said $[_S$ he $[_{AUX}$ will + Past$]$ $_S]$ $_S]$ and $[_S$ Bill actually $[_{AUX}$ Past$]$ $_S]$ $_S]$ $[_{VP}$ eat a raw eggplant$]$ $_S]$
*

Notice that, at the stage of the application of *Tense Hopping*, *Past* in the right conjunct fails to move up to the raised material because *Tense Hopping* is considered to be a bounded rule. But if it is assumed that *Do Support* can be stated to apply just in case *Tense Hopping* fails to apply, a dangling Tense can tide over the difficulty. Thus the application of *Do Support* to the dangling affix *Past* yields (3.28.e).

(3.28) e. $[_S [_S [_S$ Tom said $[_S$ he $[_{AUX}$ will + Past$]$ $_S]$ $_S]$ and $[_S$ Bill actually $[_{AUX}$ do + Past$]$ $_S]$ $[_{VP}$ eat a raw eggplant$]$ $_S]$

The relative ordering of three of the transformations involved is established as follows.

(3.29) *RNR* ⇨ *Tense Hopping* ⇨ *Do Support*

Next let us consider the derivational process of (2.2.c). The structure underlying (2.2.c) is roughly represented in (3.30.a).

(3.30) a. $[_S [_S$ John suspected $[_S$ Kathy $[_{AUX}$ Past may have-en$]$ $[_{VP}$ steal the ring$]$ $_S]$ $_S]$ and $[_S$ Albert succeeded in proving $[_S$ Sally actually $[_{AUX}$ Past have-en$]$ $[_{VP}$ steal the ring$]$ $_S]$ $_S]$ $_S]$

If *RNR* applies to (3.30.a) prior to *En/Ing Hopping*, (3.30.b) is derived.

(3.30) b. $[_S [_S [_S$ John suspected $[_S$ Kathy $[_{AUX}$ Past may have-*en*$]$ $_S]$ $_S]$ and $[_S$ Albert succeeded in proving $[_S$ Sally actually $[_{AUX}$ Past heve-*en*$]$ $_S]$ $_S]$ $_S]$ $[_{VP}$ steal the ring$]$ $_S]$
*

In (3.30.b), there remains a dangling affix *en* in the left conjunct. The perfective affix *en* has nothing to be attached to: therefore, it might be proposed that it is nullified before the application of *En/Ing Hopping*, and that an *en* in the right conjunct is attached to the verb in the raised VP. However, it is hardly possible to carry out this illegal operation by reason of *En/Ing Hopping* being a bounded rule. On the other hand, in case that *En/Ing Hopping* first applies to (3.30.a), (3.30.c) is derived.

(3.30) c. $[_S [_S$ John suspected $[_S$ Kathy $[_{AUX}$ Past may have] $[_{VP}$ steal + en the ring] $_S]$ $_S]$ and $[_S$ Albert succeeded in proving [S Sally actually $[_{AUX}$ Past have] $[_{VP}$ steal + en the ring] $_S]$ $_S]$ $_S]$

The application of *Tense Hopping* to (3.30.c) successfully results in (2.2.c). Consequently the rule ordering (3.31) is established as far as the interaction of *RNR* with the other relevant rules is concerned.

(3.31) *Passivization* ⇨ *Be Shift* ⇨ *En/Ing Hopping* ⇨ *RNR* ⇨ *Tense Hopping* ⇨ *Do Support*

Let us examine whether or not (3.31) can predict not only ungrammaticalness of *(3.32.a) but also grammaticalness of (3.32.b).

(3.32) a. *John swore Kathy, and Albert succeeded in proving that Sally, was a witch.

b. John swore Kathy was, and Albert succeeded in proving that Sally was, a witch.

The structure underlying (3.32.b) is roughly represented in (3.33.a).

(3.33) a. $[_S [_S$ John swore $[_S$ Kathy $[_{AUX}$ Past] $[_{VP}$ be a witch] $_S]$ and $[_S$ Albert succeeded in proving $[_S$ Sally $[_{AUX}$ Past] $[_{VP}$ be a witch] $_S]$ $_S]$ $_S]$

Be Shift obligatorily applies to (3.33.a), achieving the immediate result of (3.33.b).

(3.33) b. $[_S [_S$ John swore $[_S$ Kathy $[_{AUX}$ Past be] $[_{VP}$ a witch] $_S]$ and $[_S$ Albert succeeded in proving $[_S$ Sally $[_{AUX}$ Past be] $[_{VP}$ a witch] $_S]$ $_S]$ $_S]$

||

RNR

⇩

c. $[_S [_S [_S$ John swore $[_S$ Kathy $[_{AUX}$ Past be] $_S]$ and $[_S$

Albert succeeded in proving $[_S$ Sally $[_{AUX}$ Past be$]_S]_S]_S$ $[_{VP}$ a witch$]_S$

After the application of *Tense Hopping* to (3.33.c), (3.32.b) is derived, but generation of *(3.32.a) is blocked. Thus (3.31) can account for ungrammaticalness of *(3.32.a) as well as grammaticalness of (3.32.b).

3.2.2 Optionality of *Be Shift*

From the preceding discussion, a relative ordering of *RNR* and the other rules involved is proposed as in (3.31).

(3.31) *Passivization* (where *be-en* is placed at an initial position of VP) ⇨ *Be Shift* ⇨ *En/Ing Hopping* ⇨ *RNR* ⇨ *Tense Hopping* ⇨ *Do Support*

As a result of argument in 3.1, the phrase structure rules (3.25) and the rule of *Be Shift* (3.26) are provided as a part of grammar.

(3.25) and (3.26) over again.

(3.35) AUX ⟶ Tense (M) (have-en) (be-ing)
VP ⟶ V

(3.26) *Be Shift* (obligatory)

	X	$\underbrace{\text{Tense (M) (have-en)}}$	be	Y	
SD:	1	2	3	4	⟶
SC:	1	2 + 3		4	

In what follows, practical examination will be carried out on how (3.31), (3.25), and (3.26) work out in the generation of the examples below. Now observe the following.

(3.34) a. Tony should have, and Peter probably would have, been given a prize.
b. Tony should have been, and Peter probably would have been, given a prize.
c. Tony should have, and Peter probably would have, been graduating on time.
d. Tony should have been, and Peter probably would have been, graduating on time.

Let us first see the derivational processes of (3.34.a) and (3.34.b). The structure underlying both (3.34.a) and (3.34.b) is roughly represented in (3.35.a).

(3.35) a. $[_S\ [_S$ Tony $[_{AUX}$ Past shall have-en $[_{VP}$ be-en give a prize] $_S]$ and $[_S$ Peter probably $[_{AUX}$ Past will have-en] $[_{VP}$ be-en give a prize] $_S]\ _S]$

$$\Downarrow \textit{Be Shift}$$

b. $[_S\ [_S$ Tony $[_{AUX}$ Past shall have-en be] $[_{VP}$ en give a prize] $_S]$ and $[_S$ Peter probably $[_{AUX}$ Past will have-en be] $[_{VP}$ en give a prize] $_S]\ _S]$

$$\Downarrow \textit{En/Ing Hopping}$$

c. $[_S\ [_S$ Tony $[_{AUX}$ Past shall have be + en] $[_{VP}$ give + en a prize] $_S]$ and $[_S$ Peter probably $[_{AUX}$ will have eb + en] $[_{VP}$ give + en a prize] $_S]\ _S]$

$$\Downarrow \textit{RNR}$$

d. $[_S\ [_S\ [_S$ Tony $[_{AUX}$ Past shall have be + en] $_S]$ and $[_S$ Peter probably $[_{AUX}$ Past will have be + en] $_S]\ _S]$ $[_{VP}$ give + en a prize] $_S]$

The application of *Tense Hopping* to (3.35.d) results in only (3.34.b), but not (3.34.a). As long as *Be Shift* obligatorily applies, there is no way of deriving (3.34.a). If *Be Shift* is assumed to be optional only in case the structural description SD has *Tense M have-en be*, (3.34.a) is also derivable. So (3.26) is revised to (3.36).

(3.36) *Be Shift* (obligatory)

$$\begin{array}{llccl} & X & \underbrace{\text{Tense (M) (have-en)}} & \text{be} & Y \\ \text{SD:} & 1 & 2 & 3 & 4 \longrightarrow \\ \text{SC:} & 1 & 2+3 & & 4 \end{array}$$

Condition: only in case the second item of SD is *Tense M have-en*, then *Be Shift* optionally applies.

Next let us see the derivational processes of (3.34.c) and (3.34.d). The structure underlying both of them is roughly represented in (3.37.a).

(3.37) a. $[_S\ [_S$ Tony $[_{AUX}$ Past shall have-en be-ing$]$ $[_{VP}$ graduate on time$]$ $_S]$ and $[_S$ Peter probably $[_{AUX}$ Past will have-en be-ing$]$ $[_{VP}$ graduate on time$]$ $_S]$ $_S]$

||

En/Ing Hopping

⇩

b. $[_S\ [_S$ Tony $[$AUX Past shall have be + en$]$ $[_{VP}$ graduate + ing on time$]$ $_S]$ and $[_S$ Peter probably $[_{AUX}$ Past will have be + en$]$ $[_{VP}$ graduate + ing on time$]$ $_S]$ $_S]$

||

RNR

⇩

c. $[_S\ [_S\ [_S$ Tony $[_{AUX}$ Past shall have be + en$]$ $_S]$ and $[_S$ Peter probably $[_{AUX}$ Past will have be + en$]$ $_S]$ $_S]$ $[_{VP}$ graduate + ing on time$]$ $_S]$

The application of *Tense Hopping* to (3.37.c) results in only (3.34.d), but not (3.34.c). (3.25) may be revised to (3.38) in order that (3.34.c) can be derived as well.

(3.38) AUX ⟶ Tense (M) (have-en)
VP ⟶ (be-ing) V

Then, instead of (3.37.a), (3.39.a) is given as the structure underlying (3.34.c) and (3.34.d).

(3.39) a. $[_S\ [_S$ Tony $[_{AUX}$ Past shall have-en$]$ $[_{VP}$ be-ing graduate on time$]$ $_S]$ and $[_S$ Peter probably $[_{AUX}$ Past will have-en$]$ $[_{VP}$ be-ing graduate on time$]$ $_S]$ $_S]$

The application of *Be Shift* to (3.39.a) results in (3.39.b).

(3.39) b. $[_S\ [_S$ Tony $[_{AUX}$ Past shall have-en be$]$ $[_{VP}$ ing graduate on time$]$ $_S]$ and $[_S$ Peter probably $[_{AUX}$ Past will have-en be$]$ $[_{VP}$ ing graduate on time$]$ $_S]$ $_S]$

The application of *En/Ing Hopping*, *RNR*, and *Tense Hopping* in a successive order produces (3.34.c). If *Be Shift* does not apply to (3.39.a), *be* remains intact in the VP. The application of the same ordered rules produces (3.34.d) as well.

3.2.3 Summary

The arguments above provide the following.(6)

(3.31) Rule ordering

Passivization (where *be-en* is placed at an final position of VP) ⇨ *Be Shift* ⇨ *En/Ing Hopping* ⇨ *RNR* ⇨ *Tense Hopping* ⇨ *Do Support*

(3.36) *Be Shift* (obligatory)

$$\begin{array}{llccl} & X & \underbrace{[_{aux}\text{ Tense (M) (have-en)}]} & \text{be} & Y \\ \text{SD:} & 1 & 2 & 3 & 4 \longrightarrow \\ \text{SC:} & 1 & 2+3 & & 4 \end{array}$$

Condition: *Be Shift* optionally applies only in case that the second item of SD is *Tense M have-en*.

(3.38) AUX ⟶ Tense (M) (have-en)
VP ⟶ (be-ing) V

The proposals which we have advanced so far are as follows.

(3.40) a. *Passivization* is slightly modified with the operation that a grammatical formative *be-en* is inserted into the initial position of VP.

b. A new transformational rule of *Be Shift* is added to the grammar so that *be* may be optionally shifted into the position of AUX.

c. Revision of a phrase structure rule is undergone so that AUX is rewritten as Tense (M) (have-en) and VP as (be-ing) V.

With those modifications, *RNR* was relatively ordered. (3.40.a) and (3.40.b) pertain to modification in the transformational component, and (3.40.c) is related to that in the base component. In 4, it will be shown that some additional data can hardly be explained by (3.40), and that (3.40.b) must be spurned in cold blood. These facts lead to a radical revision of a phrase structure rule, and motivate the output conditions without any modification in the transformational component.

4. *Motivations of output conditions*

First, we will put forward two arguments against discussion of 3. One is involved in the formulation of *Do Support*; and the other in that of *Be shift*. In the latter, it will be demonstrated that inappropriateness of a trasformational rule of *Be Shift* induces another phrase structure rule by Ross (1969) as an alternative to (3.38). Secondly, it will be shown that, even under his analysis, *RNR* overgenerates ungrammatical strings. Some conditions must be imposed upon *RNR* in order to block the derivation of the ungrammatical strings. But it will be made clear that it is infeasible to place the conditions on *RNR* itself, but that they must be formulated as output conditions.

4.1 Counter-arguments

4.1.1 *Do Support*

Tense can not be nullified. Observe the following examples of the application of *VP Deletion*.

(4.1) a. Peter said that Jesus was Christ, and Simon did, too.
b. *Peter said that Jesus was Christ, and Simon, too.

What a pair of (4.1) shows is that Tense can not be nullified after the application of *VP Deletion*, and that *Do Support* must apply to a dangling Tense.

Let us see the examples of the application of *RNR*.

(4.2) a. Tom said he would, but Bill actually did, see the Superman.
b. Tom said he would, but Bill did, see the Superman.
c. *Tom said he would, but Bill, see the Superman.

The structure of (4.2.a) right after the application of *RNR* is roughly represented in (4.3.a).

(4.3) a. $[_S [_S [_S$ Tom said $[_S$ he $[_{AUX}$ Past will$]$ $_S]$ $_S]$ but $[_S$ Bill actually $[_{AUX}$ Past$]$ $_S]$ $_S]$ $[_{VP}$ see the Superman$]$ $_S]$

According to our analysis (3.31), *Tense Hopping* applies to (4.3.a) after the application of *RNR*. The rule can apply only to Tense in the left conjunct, but it does not apply to Tense in the right conjunct because of the fact that *Tense Hopping* is a bounded rule. Thus the structure immediately after *Tense Hopping* is (4.3.b).

(4.3) b. $[_S [_S [_S$ Tom said $[_S$ he $[_{AUX}$ will + Past$]$ $_S]$ $_S]$ but $[_S$ Bill actually $[_{AUX}$ Past$]$ $_S]$ $_S]$ $[_{VP}$ see the Superman$]$ $_S]$

At this derivational stage, *Past* in the right conjunct must not be nullified, but remains intact so that *Do Support* can apply: otherwise, generation of well-formed sentences, (4.2.a) and (4.2.b), were blocked, and that of an ill-formed sentence *(4.2.c) carried out. Therefore, our assumption is that Tense can not be nullified even if it is a dangling Tense which resulted from failure of the application of *Tense Hopping*, and that *Do Support* applies to the Tense. This is more formally stated as follows.

(4.4) *Tense Hopping*

	$[_S$ X	Tns	Y $_S]$		
SD:	1	2	3	$\xrightarrow{obli.}$	
SC:	1		3 + 2		

where Y = [+v]

Do Support

	X	Tns	Y	
SD:	1	2	3	$\xrightarrow{obli.}$
SC:	1	do + 2	3	

(where *Do Support* is ordered after *Tense Hopping*.)

With this in mind, consider the following.

(4.5) a. *John claims that Mary, and Tom thinks that Nancy, stole the ring.

b. ?*John claims that Mary did, and Tom thinks that Nancy did, steal the ring.

The derivation of *(4.5.a) is blocked by the rule ordering (3.31). Let us see the derivational process in detail. The phrase structure rules in the base component may generate such an underlying structure as (4.6.a).

(4.6) a. $[_S [_S$ John claims $[_S$ that Mary $[_{AUX}$ Past$]$ $[_{VP}$ steal the ring$]$ $_S]$ $_S]$ and $[_S$ Tom thinks $[_S$ that Nancy $[_{AUX}$ Past$]$

$[_{VP}$ steal the ring$]_S]_S]_S$

$\Downarrow$ *RNR*

b. $[_S [_S [_S$ John claims $[_S$ that Mary $[_{AUX}$ Past$]_S]_S]$ and $[_S$ Tom thinks $[_S$ that Nancy $[_{AUX}$ Past$]_S]_S]$ $[_{VP}$ steal the ring$]_S]$

At the stage of (4.5.b), *Tense Hopping* fails to apply. According to our analysis, *Do Support* applies to the dangling *Past's* in both conjuncts. ?*(4.5.b) is erroneously derived by (3.31). After all (3.31) is rejected as a reliable rule ordering.

4.1.2 Inappropriateness of *Be Shift*

Be Shift formulated by Akmajian and Wasow (1974) fails to be a transformation in its nature. *Be Shift* is mentioned here again.

Be Shift

	X	$\underbrace{\text{Tense (M) (have-en)}}$	be	Y	
SD:	1	2	3	4	$\xrightarrow{\text{obli.}}$
SC:	1	2 + 3		4	

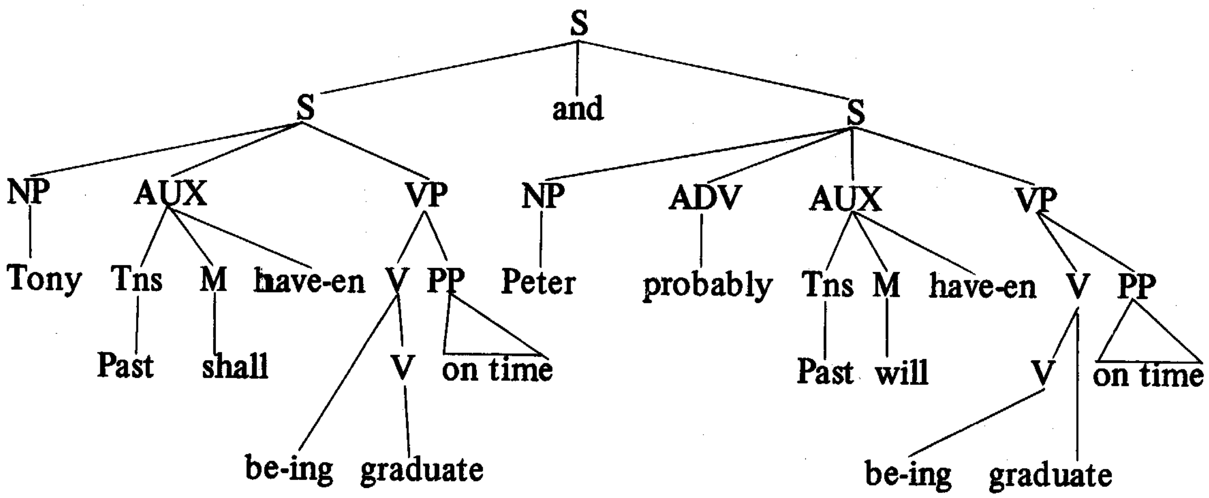
Condition: *Be Shift* optionally applies only in case that the second item of SD is *Tense M have-en.*

The rule refers to one of a terminal string *be* to the effect that the *be* is shifted into AUX, and becomes the "sister". Take (4.7) for example.

(4.7) Tony should have been, and Peter probably would have been, graduating on time. (= (3.38.d))

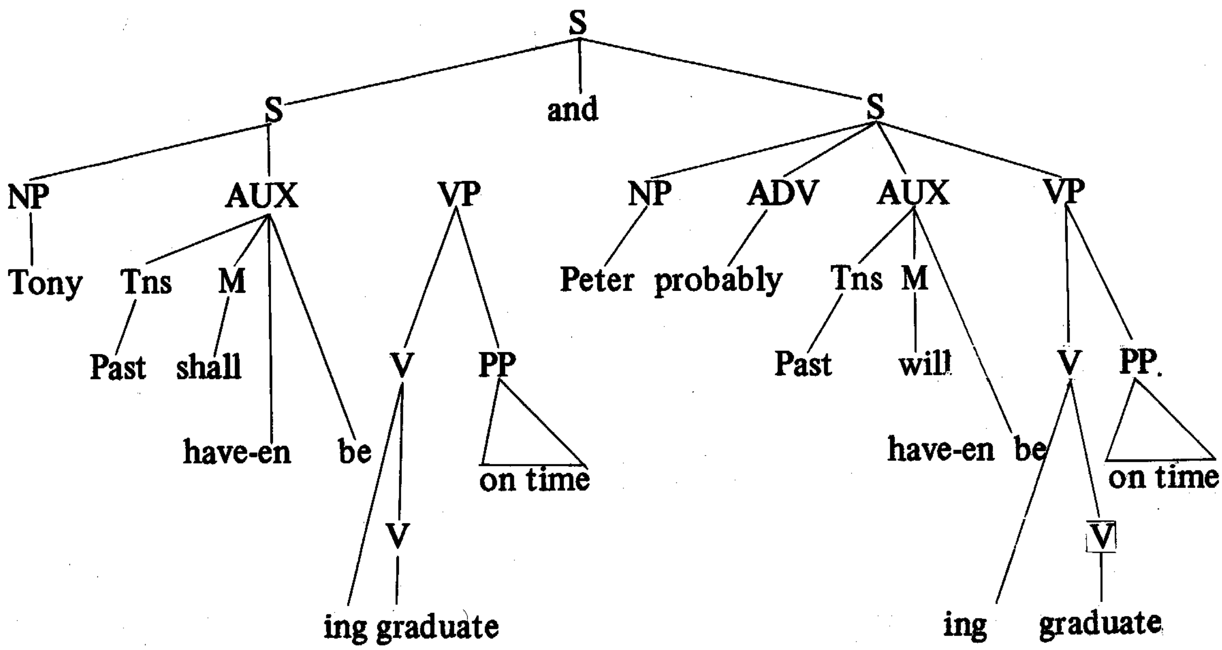
(4.8.a) is the structure underlying (4.8.b).

(4.8) a.



The application of *Be Shift* to (4.8.a) derives (4.8.b).

(4.8) b.



The rule refers only to a grammatical formative *be*. If this is the case, a proper mapping of Phrase-Marker is not carried out.

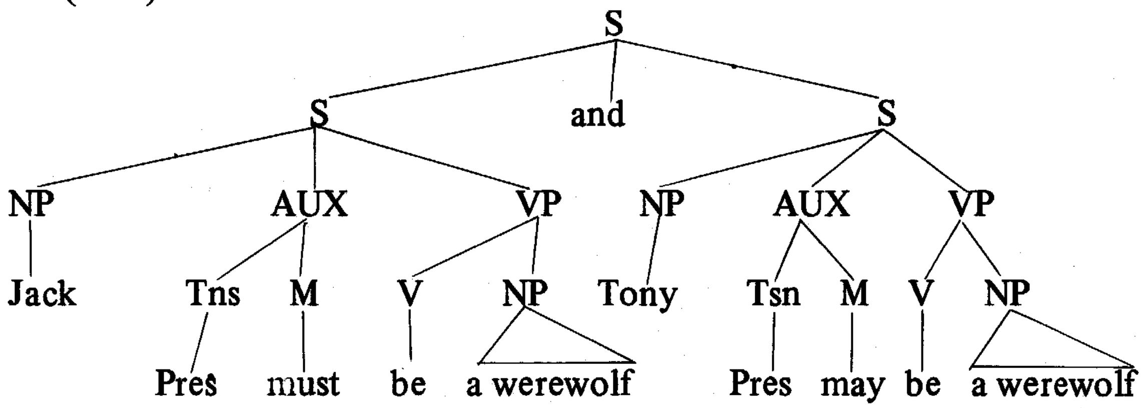
Observe another example of *Be Shift*.

(4.9) Jack must be, and Tony may be, a werewolf.

(= (3.27.b))

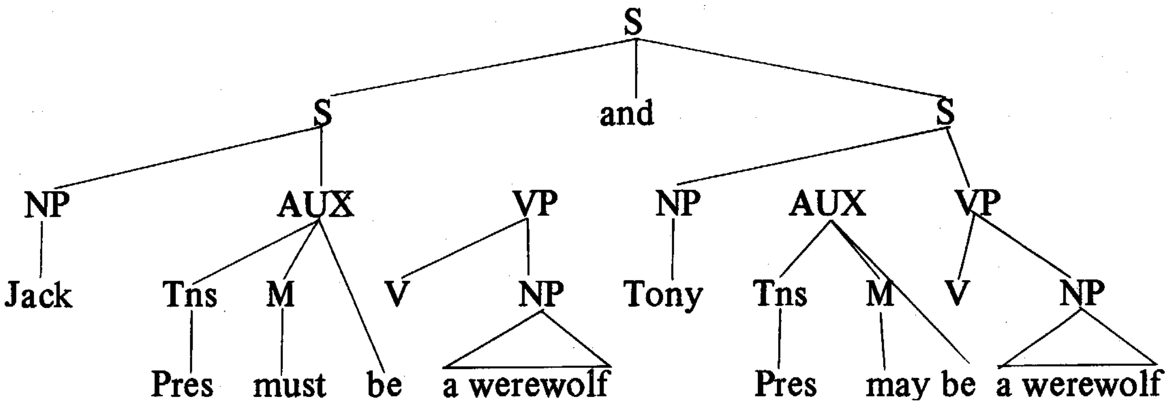
The structure underlying (4.9) is represented in (4.10).

(4.10)



The application of *Be Shift* to (4.10) derives (4.11).

(4.11)



In (4.11) there remain dangling constituents V's in both conjuncts. By convention, the V's are deleted. What *Be Shift* effects is, after all, the rearrangement of the tree structure, but not that of terminal strings. The difficulty of *Be Shift* is that it does not affect terminal strings but only a tree configuration. Thus *Be Shift* does not have an adequate status of transformation.

4.1.1 constitutes a strong counter-argument against the hypothesis of the rule ordering (3.31). 4.1.2 shows a serious difficulty of introducing into a grammar a transformational rule whose existence in possible human languages has not sufficiently been testified on an empirical basis. A particular transformation of *Be Shift* is one of the rules of little evidence in favor of existence, as the literature on transformational generative grammar shows. Furthermore, 4.4.2 indicates that *Be Shift* is out of a proper function of transformation. Thus inappropriateness of *Be Shift* prevents the transformation from entering into grammar. 4.1 as a whole constitutes a strong counter-argument against a mere modification of transformational and base components such as (3.40).

4.2 Adoption of Ross's analysis

Two counter-arguments in 4.1 against (3.31) and (3.36) effect a drastic alteration on the phrase structure rules (3.38).

Discussion so far has presupposed the phrase structure rule which rewrites a sentence S as NP AUX VP. In conjunction with phrase structure rules, we may as well adopt Ross's analysis of auxiliaries as main verbs (Ross 1969). He points out that all verbs are directly dominated by VP in the deep structure. The term, *verbs*, covers what have traditionally been called adjectives, auxiliaries, the copula, and true verbs. So it is assumed that in the deep structure, each of the five italicized words in (4.12) must be the main verb of some underlying sentence.

(4.12) Boris *must have been being examined* by the captain.

4.2.1 Differentiation of *Affix Hopping* under Ross's analysis

It is necessary to differentiate *En/Ing Hopping* from *Tense Hopping* even under Ross's analysis. Let us re-examine the derivational process of (2.2.a) under his analysis.

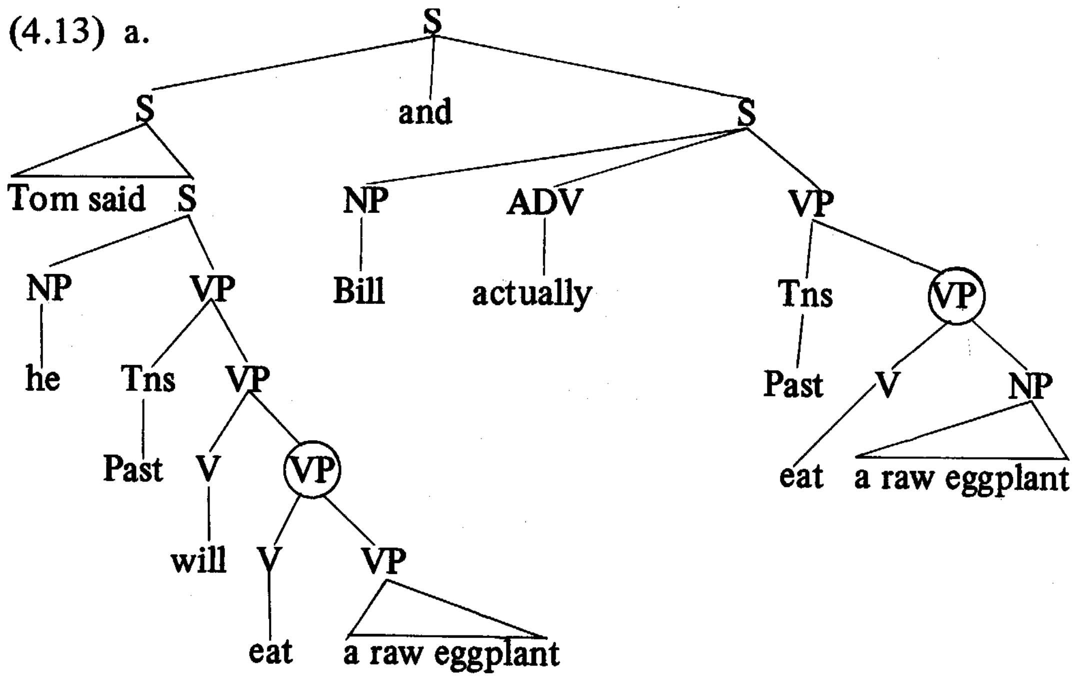
(2.2.a) Tom said he would, and Bill actually did, eat a raw eggplant.

The structure underlying (2.2.a) is roughly represented in (4.13.a). On the assumption that *En/Ing Hopping and Tense Hopping* are regarded as a single rule of *Affix Hopping,* and that it is ordered prior to *RNR,* (4.13.b) is derived after the application of *Affix Hopping* to (4.13.a). At the stage of the application of *RNR*, the encircled VP's on both conjuncts in (4.13.b) are not identical. *RNR* fails to apply to (4.13.b). (2.2.a) will not be derived if it is assumed that *Affix Hopping* applies prior to *RNR*. On the other hand, if it is assumed that *En/Ing Hopping* and *Tense Hopping* are different rules, and that the rule ordering (4.14) stands good, (2.2.a) is successfully derived.

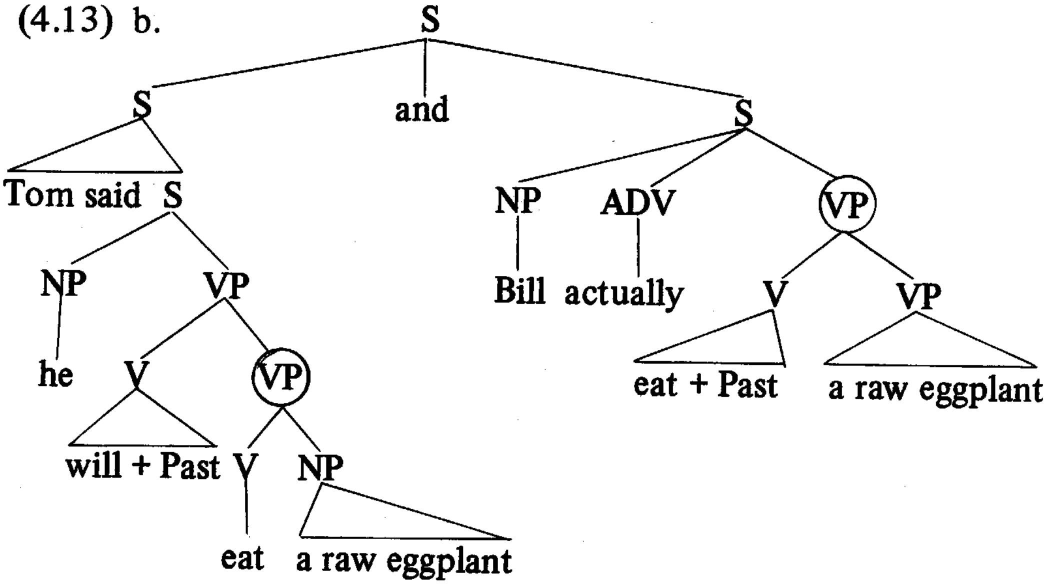
(4.14) *En/Ing Hopping* ⇨ *RNR* ⇨ *Tense Hopping*

Let us see the derivation of (2.2.a) under the hypothesis (4.14). (4.15) is a

(4.13) a.



(4.13) b.

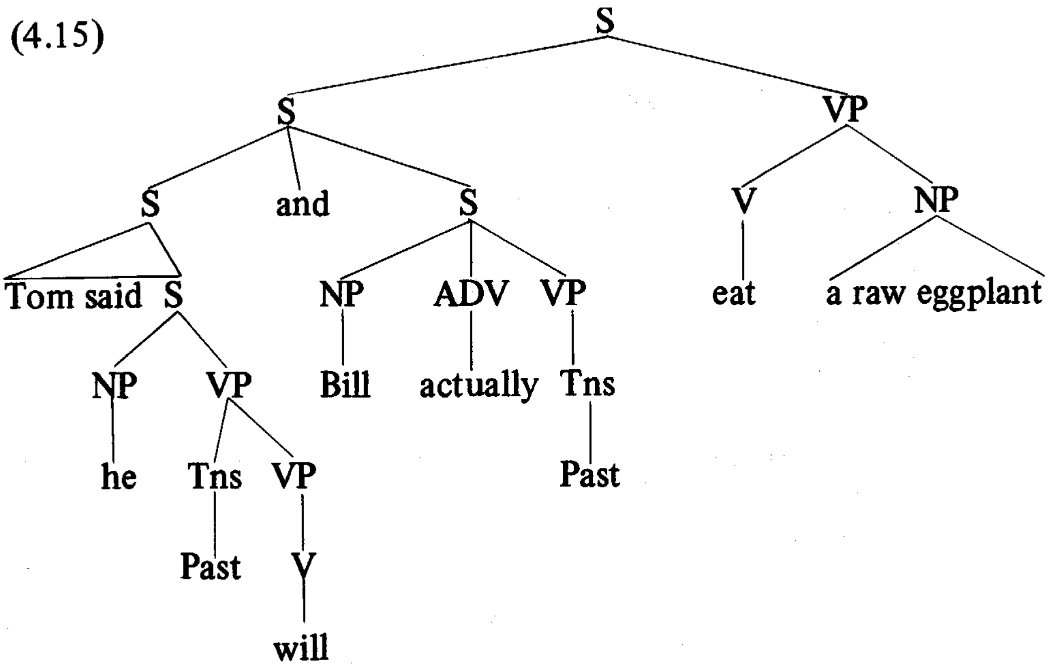


derived structure right after the application of *RNR* to the encircled VP's in (4.13.a). (2.2.a) will be properly derived after the application of *Tense Hopping* to (4.15) and the subsequent *Do Support* to the output. The relative rule ordering (4.16), therefore, is assumed in the following discussion.

(4.16) *En/Ing Hopping* ⇨ *RNR* ⇨ *Tense Hopping* ⇨ *Do Support*

4.2.2 Overgeneration

(4.15)



(4.16) overgenerates the following examples under Ross's analysis of auxiliaries. Observe the following.

(4.17) a. *John claims that Mary, and Tom thinks that Nancy, stole the rings. (= (4.5.a))

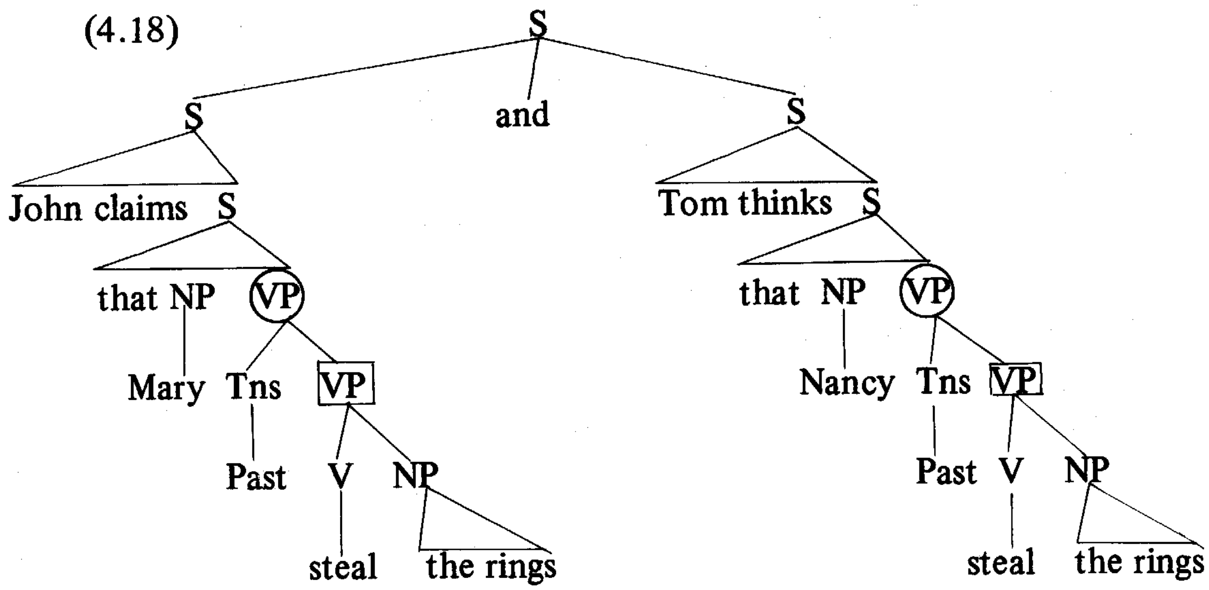
b. ??*John claims that Mary did, and Tom thinks that Nancy did, steal the rings. (= (4.5.b))

c. *John swore Kathy, and Albert succeeded in proving that Sally, was a witch. (= (3.32.a))

d. *John swore Kathy did, Albert succeeded in proving that Sally did, be a witch.

Take *(4.17.a) for example. The structure before the application of *RNR* is roughly represented in (4.18). *RNR* is applicable to either the encircled VP's or the squared VP's. Suppose first that *RNR* applies to the encircled VP's prior to *Tense Hopping. Tense Hopping* applies to the output, and then *(4.17.a) is derived. Secondly, suppose that *RNR* applies to the squared VP's prior to *Tense Hopping. Tense Hopping* can not apply to the output because *Tense Hopping* is a bounded rule in which it can not move up Tense across the sentence boundaries. Then as in 4.1.1, *Do Support* applies to the output of *RNR*. The derived sentence is ??*(4.17.b.), which is eventually unacceptable. Notice that *(4.17.a) and *(4.17.c) show that *RNR* can not apply to the highest VP, which means that Tense should be left intact. *Do Support* applies to the dangling Tense, so that at least one constituent remains on the VP's in both conjuncts on the surface structure level.

(4.18)



Next observe the following to see the reason why neither ??*(4.17.b) nor *(4.17.d) is acceptable.

(4.19) a. Tom said he would, and Bill actually did, eat a raw eggplant.
b. ??*Tom said he would, and Bill would, eat a raw eggplant.
c. George will, and I believe that Bob might, take the course.
d. ?*George will, and I believe that Bob will, take the course.
e. ?*George might, and I believe that Bob might, take the course.(7)

What (4.19) implies is that there should be a different sequence of element(s) in both VP's on the surface structure level in order that a sentence derived by *RNR* can be acceptable.

To summarize discussion of this section, (A) there should be at least one constituent in each VP of both conjuncts on the surface structure level so that a sentence applied by *RNR* can be acceptable, and furthermore (B) both VP's must consist of a different sequence of formatives on the surface structure level. If *RNR* obeys conditions (A) and (B), *(4.17), ??*(4.19.b), *(4.19.d), and *(4.19.e) are blocked. The problem is whether or not *RNR* can bear the burdensome conditions (A) and (B).

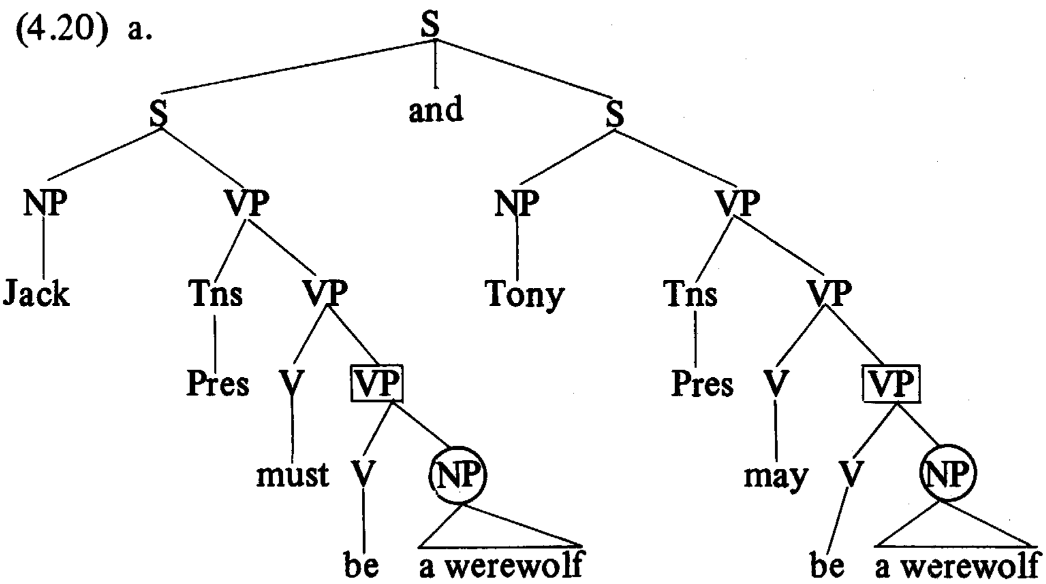
There is another example of overgeneration. Observe the following again.

(3.27) a. ?*Jack must, and Tony may, be a werewolf.

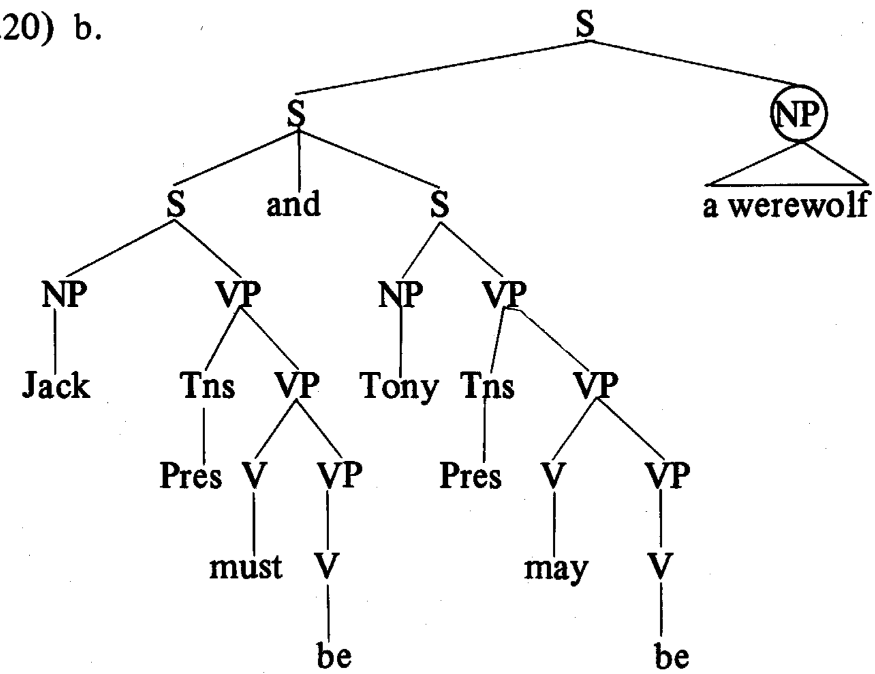
b. Jack must be, and Tony may be, a werewolf.

The structure before the application of *RNR* is roughly represented in (4.20.a).

(4.20) a.



(4.20) b.



RNR can apply to the encircled NP's in both conjuncts, so that the output structure is (4.20.b). The application of *Tense Hopping* to (4.20.b) yields (3.27.b). But notice that if *RNR* applies to the squared VP's in (4.20.a), the ill-formed sentence ?*(3.27.a) is derived. The problem is how to block generation of ?*(3.27.a).

4.2.3 Impossibility of placing the conditions on *RNR*

As is shown in the preceding section, it must first be guaranteed (A) that there is at least one constituent on each VP of both conjuncts on the surface structure level in order that a sentence applied by *RNR* can be acceptable. Observe the following.

(3.34) a. Tony should have, and Peter probably would have, been given a prize.

b. Tony should have been, and Peter probably would have been, given a prize.

(3.34.a) has two constituents, and (3.34.b) three constituents in VP's of both conjuncts. Next observe the following.

(4.21) John might have been, and Peter certainly was, writing letters.

(4.21) has three constituents in the VP of the left conjunct, but one constituent in the VP of the right conjunct. These facts cause a slight revision of (A) into (4.22).

(4.22) A sentence is acceptable if each conjunct on the surface structure level has at least one constituent or at most three constituents dominated by the highest VP.

Now suppose that condition (4.22) is to be incorporated into the transformation of *RNR*. (4.22) may not be incorporated into *RNR* if it can not be properly mentioned in the structural description of *RNR*. It is generally admitted that the domain of transformations is mentioned in the structural description which is based upon three kinds of logical symbols, logical sum OR, logical product AND, and negation NOT; namely, the structural description is characterized by Boolean conditions on analyzability. But (4.2.2) is incompatible with Boolean conditions because (4.22) must refer to the number of the verbs on the VP of each conjunct.(8) If the condition (4.22) is imposed on *RNR*, the structural description must use such a device of quantifier as in (4.23).

(4.23) *RNR*

$$X\ V_1^3\ VP_i\ Y\ V_1^3\ VP_i$$ (9)

But (4.23) is not acceptable as a proper formula of transformations. Thus it is hardly possible to impose (4.22) upon the transformation of *RNR*.

Another factor causes abandonment of the grammar in which rule ordering (4.16) alone is available as explanation of the derivational process of the sentences to which *RNR* has applied. As in 4.2.2, *RNR* must guarantee (B), which is more precisely restated in (4.24).

(4.24) A sentence is acceptable if a sequence of constituents in both VP's differs from another on the surface structure level in case the VP's have the same number of constituents.

(4.24) is not allowed to impose on *RNR* itself. If *RNR* assures (4.24), it is stated as follows.

(4.25) *RNR*

	X $[_{VP}$	V_L	$[VP_i]]$	Y $[_{VP}$	V_R	$[VP_i]]$	
SD:	1	2	3	4	5	6	$\xrightarrow{\text{opt.}}$
SC:	[1	2	ϕ	4	5	ϕ] #6	

where (i) 3 = 6

(ii) if 2 = 5 in number, 2 is not identical to 5

But as in (1.3), the structural description of *RNR* is provided as follows.

(4.26)	X	A_i	Y	A_i
SD:	1	2	3	4

where 2 = 4

If such a structural description as (4.25) must be provided only in case of raising from VP, proper analysis (4.26) of *RNR* loses the generality. Given (4.26) for proper analysis, *RNR* can not refer to the elements to the left of the identical materials; therefore, (4.24) may not be incorporated into *RNR* itself. It follows from this fact that *RNR* must be assumed to raise any identical material at a final position.

Transformation has a great generality in its application, but a transformational component tends to overgenerate ungrammatical strings without *ad* *hoc* conditions. This defect can be corrected by placing the well-formed conditions on the output of the transformational component.

5. *Formulation of output conditions*

This paper is mainly concerned with the raising of identical constituents from VP. *RNR* is permitted to apply to *any* single major constituent at a final posision.(10) As in 4, it is not feasible that both conditions (4.22) and (4.24) are imposed on the transformation *RNR*. *RNR* without these conditions would yield unacceptable strings. In our framework, therefore, unacceptable surface strings derived by the application of *RNR* are to be ruled out by output conditions. In what follows, a precice formulation of output conditions is demonstrated.

As prerequisites to this section, the following is assumed.

RNR

$$\begin{array}{llllll} & X & A_i & Y & A_i & \\ \text{SD:} & 1 & 2 & 3 & 4 & \xrightarrow{\text{opt.}} \\ \text{SC:} & [1 & \phi & 3 & \phi]\ \#4 & \\ & & \multicolumn{3}{l}{\text{where } 2 = 4} & \end{array}$$

RNR is not equipped with any further conditional statement. In addition to this *RNR*, Ross's analysis of auxiliaries as main verbs is adopted as phrase structure rules, and a relative ordering of rules concerned is assumed as follows.

Rule ordering: *En/Ing Hopping* ⇨ *RNR* ⇨ *Tense Hopping* ⇨ *Do Support*

5.1 Command relation

Let us first establish some terminologies. α is the highest VP. L is designated as a sequence of the terminal constituents dominated by α . "B" and "X" are designated as a sharp international break and raised materials, respectively. Thus in its most general form the output conditions for well-formedness might be stated as follows.

(5.1) Given the structure

$\ldots [_{\alpha}\, L_1] \ldots [_{\alpha}\, L_2]$ BX ,

X asymmetrically commands α

where L_1 and L_2 meet some conditions

These conditions associated with L_1 and L_2 are explicated in what follows.

(5.2) a. Tom said he would, and Bill actually did, eat a raw eggplant. (= (4.19.a))

b. ??*Tom said he would, and Bill would, eat a raw eggplant. (= (4.19.b))

c. *Tom said he, and Bill, would eat a raw eggplant.

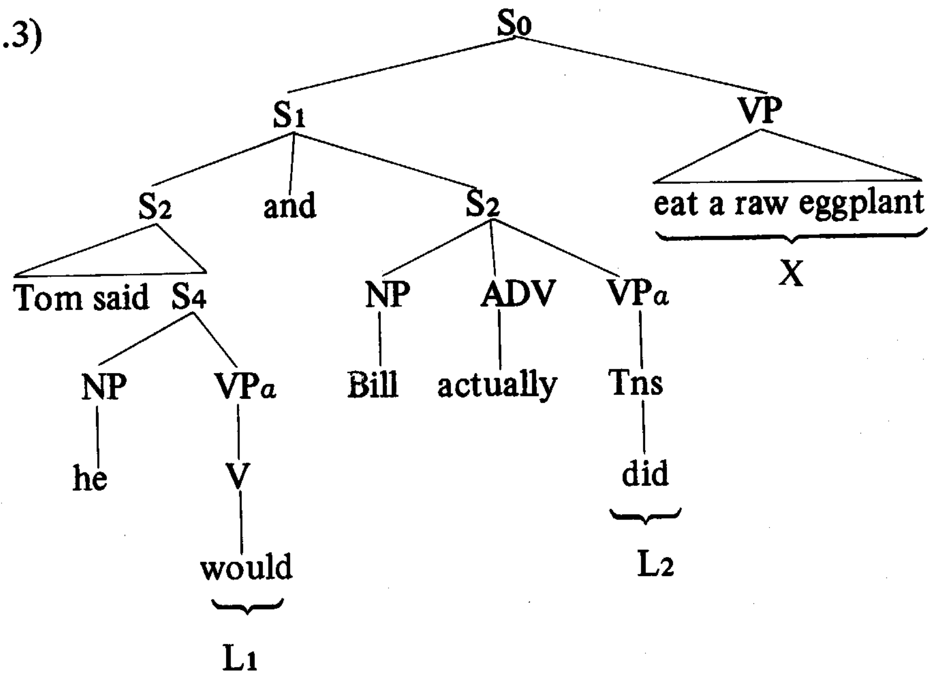
d. George will, and I believe that Bob might, take the course. (= (4.19.c))

e. ??*George will, and I believe that Bob will, take the course. (= (14.19.d))

f. *George, and I believe that Bob, will take the course.

Take (5.2.a) for example. (5.2.a) has the derived surface structure like (5.3).

(5.3)



Well-formedness conditions on (5.3) are stated as follows.

(5.4) a. L_1 and L_2 must contain at least one constituent, and

b. if L_1 and L_2 have the same number of constituents, L_1 should not be identical to L_2.

Suppose that (5.4) is formally represented as in (5.5).

(5.5) a. $L_i \supset C_i^1$[11] and

b. if $L_1 = L_2$ in number, $L_1 \neq L_2$

Then output condition (5.6) is provided as follows.

(5.6) Given the structure

$\ldots [_{\alpha} L_1] \ldots [_{\alpha} L_2]$ BX

X asymmetrically commands α

$$\text{Condition} \begin{bmatrix} \text{(i)} \ L_i \supset C_1^1 \\ \text{(ii) If } L_1 = L_2 \text{ in number, } L_1 \neq L_2 \end{bmatrix} \quad (12)$$

(5.6) rules out ??*(5.2.b), *(5.2.c), ??*(5.2.e), and *(5.2.f).

Observe (3.27.a) and (3.27.b) again.

(3.27) a. ?*Jack must, and Tony may, be a werewolf.

(5.6) rules out ??*(5.2.b), *(5.2.c), ??*(5.2.e), and *(5.2.f).

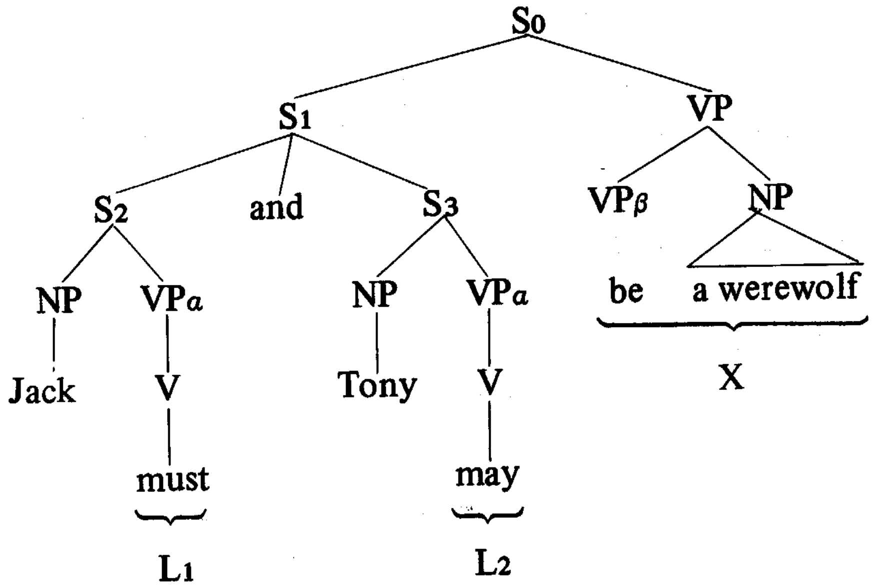
Observe (3.27.a) and (3.27.b) again.

(3.27) a. ?*Jack must, and Tony may, be a werewolf.

b. Jack must be, and Tony may be, a werewolf.

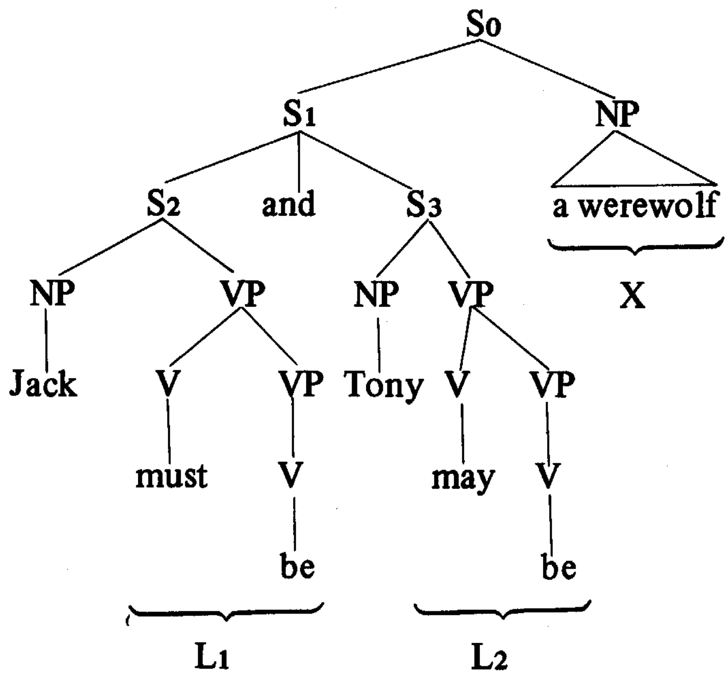
(5.6) fails to rule out ?*(3.27.a). The surface structure of (3.27.a) is represented in (5.7).

(5.7)



In (5.7) one more terminology is added to grammar: β is designated as the leftmost constituent dominated by the node which exhaustively dominates X. (5.7) meets conditions (i) and (ii) of (5.6), but in fact it must be characterized as unacceptable. In case that β is $\begin{bmatrix} +\text{v} \\ +\text{be} \\ +\text{infinitive} \end{bmatrix}$, the structure like (5.7) is ruled out even if it meets (5.6). On the other hand, the acceptable sentence (3.27.b) is characterized as unacceptable by (5.6). Let us see the surface structure of (3.27.b). It is represented in (5.8).

(5.8)



It follows from (5.8) that L_i may contain two constituents. Thus (5.6) is modified into (5.9).

(5.9) Given the structure

$\ldots [_\alpha L_1] \ldots [_\alpha L_2]$ BX

X asymmetrically commands α

$$\text{Conditions:} \left[\begin{array}{l} \text{(i)} \;\; L_i \supset C_1^2 \text{ and } \beta \neq \begin{bmatrix} +\text{v} \\ +\text{be} \\ +\text{infinitive} \end{bmatrix} \\ \text{(ii)} \;\; \text{If } L_1 = L_2 \text{ in number,} \\ \qquad L_1 \neq L_2 \end{array} \right]$$

(5.9) characterizes (3.27.b) as acceptable, but rules out *(3.27.a).

Observe the following.

(5.10) a. Tony should have, and Peter probably would have, been given a prize.

b. Tony should have been, and Peter probably would have been, given a prize.

c. Tony should have, and Peter probably would have, been graduating on time.

d. Tony should have been, and Peter probably would have been, graduating on time.

(5.9) characterizes (5.10.b) and (5.10.d) as unacceptable. Therefore modification must be done in such a way that L_i may contain three constituents. (i) of (5.9) is revised to (5.11).

(5.11) $L_i \supset \dot{C}_i^3$ and $\beta \neq \begin{bmatrix} +\text{v} \\ +\text{be} \\ +\text{infinitive} \end{bmatrix}$

It is neccessary that (5.11) should be further modified. Observe the following.

(5.12) a. *Tony should, and Peter probably would, have been given a prize.

b. *Tony should, and Peter probably would, have been graduating on time.

c. *Tony should, and Peter probably would, have called Grace.

It follows from the examples in (5.12) that β should not be $\begin{bmatrix} +\text{v} \\ +\text{have} \\ +\text{perfective} \end{bmatrix}$; therefore, (5.11) is modified into (5.13).

(5.13) $L_i \supset C_i^3$ and $\beta \neq \left\{ \begin{matrix} \begin{bmatrix} +\text{v} \\ +\text{be} \\ +\text{infinitive} \end{bmatrix} \\ \begin{bmatrix} +\text{v} \\ +\text{have} \\ +\text{perfective} \end{bmatrix} \end{matrix} \right\}$ [13]

Notice that it is not necessarily true that L_1 and L_2 have the same number of constituents within the domain of L: namely, L_1 may outnumber L_2, and vice versa. Observe the following.

(5.14) a. Bob *is*, and George *may be*, playing for the school.

b. Alice *may have*, and Sylvia certainly *has*, eaten.

c. John *might have been*, and Peter certainly *was*, writing the letter.

d. Peter certainly *was*, and John *might have been*, writing the letter.

(5.13) can also account for such examples as (5.14) in which L_1 and L_2 have the different number of constituents respectively.

The upper limit in (5.13) may be infinite. Observe the following.

(5.15) a. Jack [$_{VP}$ bought from Nancy], and Bill [$_{VP}$ gave to Sally], a book which taught him organic knitting.

b. Jack [$_{VP}$ hought from that beautiful girl], and Bill [$_{VP}$ gave to that old lady], a book which taught him organic knitting.

c. Jack [$_{VP}$ hought from that beautiful girl in white], and Bill [$_{VP}$ gave to that old lady in spectacles], a book which taught him organic knitting.

Theoretically, an infinite number of elements may be added to VP's through such recursive devices as conjunctions and relative clause formation. Thus (5.13) is modified into (5.16).

(5.16) $L_i \supset C_1^n$ and $\beta \neq \left\{ \begin{bmatrix} +v \\ +be \\ +infinitive \end{bmatrix} \atop \begin{bmatrix} +v \\ +have \\ +perfective \end{bmatrix} \right\}$

Condition (ii) of (5.9) is also modified on the basis of (3.32). (3.32) over again.

(3.32) a. *John swore Kathy, and Albert succeeded in proving that Sally, was a witch.

b. John swore Kathy was, and Albert succeeded in proving that Sally was, a witch.

(5.16) successfully rules out *(3.32.a), but (ii) of (5.9) erroneously rules out (3.32.b), which is acceptable; therefore (ii) of (5.9) is modified into (5.17).

(5.17) $L_1 \neq L_2$ except for L_1 & L_2 = $\begin{bmatrix} +v \\ +be \\ +past \end{bmatrix}$ if $L_1 = L_2$ in number

5.2 *In construction with*

The previous argument provides output condition (5.18).

(5.18) Given the structure

$\ldots [_\alpha L_1] \ldots [_\alpha L_2]$ BX

X asymmetrically commands α

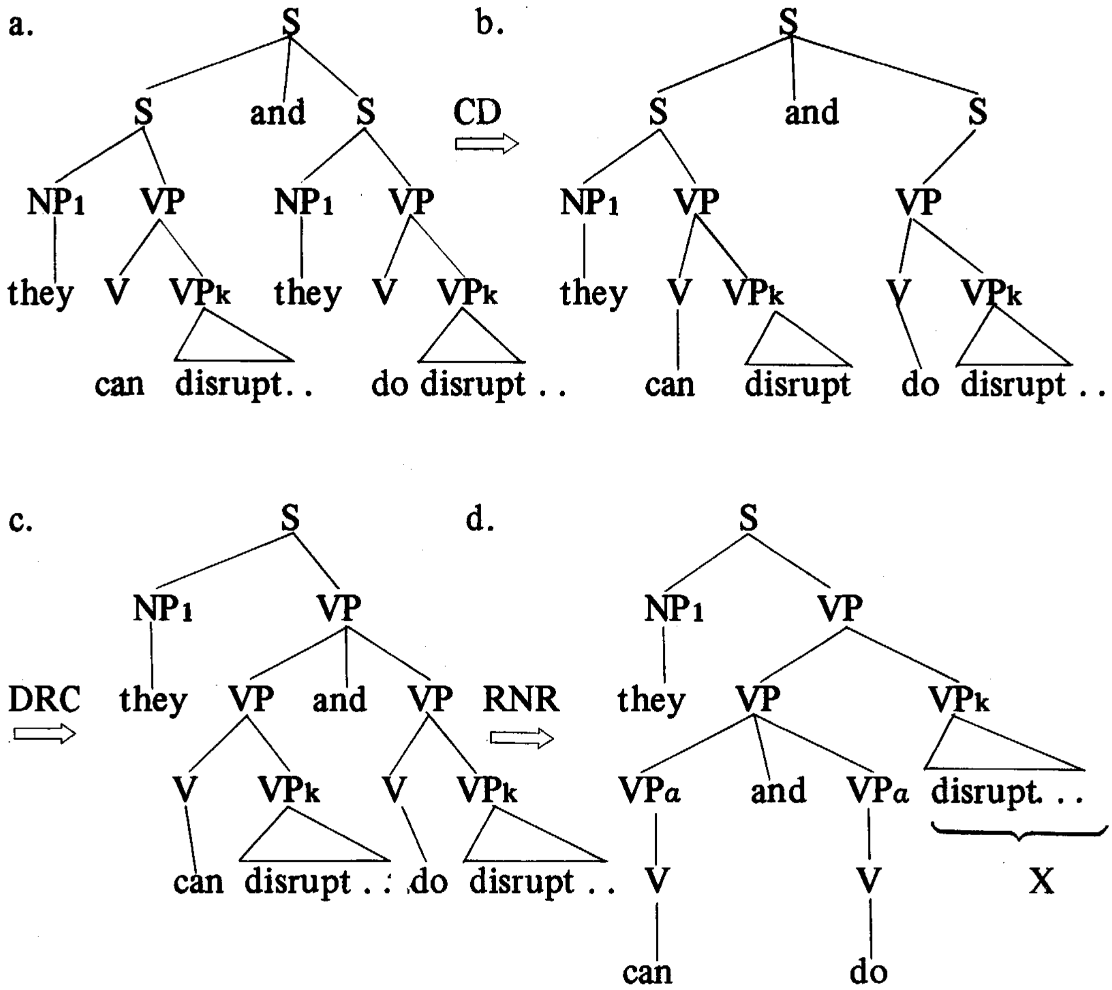
$$\text{Conditions:} \begin{bmatrix} \text{(i)} & L_i \supset C_1^n \text{ and } \beta \neq \left\{ \begin{matrix} \begin{bmatrix} +v \\ +be \\ +infinitive \end{bmatrix} \\ \begin{bmatrix} +v \\ +have \\ +perfective \end{bmatrix} \end{matrix} \right\} \\ \text{(ii)} & L_1 \neq L_2 \text{ except for} \\ & L_1 \ \& \ L_2 = \begin{bmatrix} +v \\ +be \\ +past \end{bmatrix} \\ & \text{if } L_1 = L_2 \text{ in number} \end{bmatrix}$$

It is not always true that raised materials command α. Observe (1.5.j) again where Hankamer's *Coordinate Deletion* (henceforth *CD*) has already applied before the application of *RNR*.

(1.5) j. They can, and do, disrupt currency markets by shifting huge sums from, say, dollars into Deutsche Marks.

Schematically, the derivation of (1.5.j) is as follows.

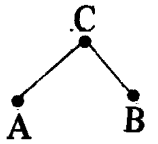
(5.19)

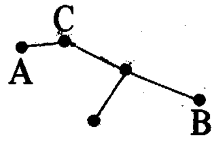


(The details are omitted in this scheme.)

Hankamer's *CD* is equipped with the *Deletion-Reduction Convention* (henceforth *DRC*) which is not a transformation. *DRC* is the convention in which, whenever, as a result of deletion of conjoined structures, a constituent is left dominated by S, the constituent is automatically conjoined with the corresponding constituent in the leftmost S.

Now notice that, in (5.19.d), X does not command α's in that the α's are not dominated by the lowest S node that dominates X. The relation between the raised X and the α's in such an example as (5.19.d) is the relation "in construction with". Given two constituent A and B, B is said to be in construction with A if the node C that directly dominates A also dominates B. In (5.20.a) and (5.20.b), B is in construction with A.

(5.20) a. 

b. 

Thus in (1.5.j) where *Deletion Reduction* (namely, *CD* followed by *DRC*) has already occurred before the application of *RNR* in the derivational process, α is in construction with X on the surface structure level. Thus (5.18) is re-written as (5.21).

(5.21) Given the structure

$\ldots [_{\alpha}\, L_1] \ldots [_{\alpha}\, L_2]$ BX,

α is *in construction with* X

$$\text{Conditions: } \left[\begin{array}{l} \text{(i) } L_i \supset C_1^n \text{ and } \beta \neq \left\{ \begin{array}{l} \begin{bmatrix} +\text{v} \\ +\text{be} \\ +\text{infinitive} \end{bmatrix} \\ \begin{bmatrix} +\text{v} \\ +\text{have} \\ +\text{perfective} \end{bmatrix} \end{array} \right\} \\ \text{(ii) } L_1 \neq L_2 \text{ except for } L_1 \;\&\; L_2 = \begin{bmatrix} +\text{v} \\ +\text{be} \\ +\text{past} \end{bmatrix} \\ \qquad \text{if } L_1 = L_2 \text{ in number} \end{array} \right]$$

6. *Conclusions*

Such syntactic conditions as (4.22) and (4.24) are too burdensome to be described in terms of the transformational component, and we have given sufficient evidence that output conditions can and must be responsible for description of some syntactic conditions; therefore, output conditions need to be incorporated into grammar. In conclusion, some merits in favor of output conditions are claimed. First of all, they can define grammatical relation on the surface structure level by taking advantage of the notion of "in construction with". A deep structure constraint can not be responsible for this job because the relationship "in construction with" is not available before the application of a transformational rule of *RNR*. Secondly the conditions such as (i) and (ii) of (5.21) provides an incentive to further investigation into perceptual strategies on performance level.

NOTES

(1) This is a much revised version of my M.A. thesis (1976) presented to International Christian University.

(2) According to Hankamer (1973), one of the properties of *RNR* in contrast with left conjunction reduction is that *RNR* fails to obey one of the constraints on pied piping. the following.

(i) I am confident of, and my boss depends on, a successful outing at the track. (Ross 1967: 126)

(ii) He was a friend to, and a strong supporter of, the party.

Hankamer provides explanation concerning (i) and (ii) that an NP has been moved to the right out of a prepositional phrase, in violation of one of the pied piping constraints under such a movement.

(3) In these examples, *Coordinate Deletion* followed by *Deletion Reduction Convention* is assumed to precede *RNR*. See 5.2 in detail.

(4) Abbreviations are as follows: NW=*Newsweek*, TM=*Time*, and LF=*Life*.

(5) The structure underlying (3.2.b) is roughly represented in (i).

(i) $[_S$ $[_S$ the CIA $[_{AUX}$ Pres] $[_{VP}$ guard our freedoms] $_S]$ and $[_S$ the FBI $[_{AUX}$ Pres] $[_{VP}$ guard our freedoms] too $_S]$ $_S]$

If *Affix Hopping* applies to (i) prior to *VP Deletion*, the resultant structure is (ii).

(ii) $[_S$ $[_S$ the CIA $[_{VP}$ guard + Pres our freedoms] $_S]$ and $[_S$ the FBI $[_{VP}$ guard + Pres our freedoms] too $_S]$ $_S]$

The application of *VP Deletion* yields ungrammatical strings (iii).

(iii) *The CIA guards our freedoms and the FBI, too.

Consequently, the rule ordering (3.4) is rejected as an explanation of the derivation of (3.2.b). If *VP Deletion* applies to (i) prior to *Affix Hopping*, there remains *Pres* in the right conjunct, and *Do Support* subsequently applies. (3.2.b) is derived. Therefore, in the derivational process of (3.2.b), *VP Deletion* must apply prior to *Affix Hopping*.

(6) (3.40) and (3.42) make it possible for *VP Deletion* to delete one single constituent. Observe the following.

(i) John may have been using drugs and Bill may have been, too.

(ii) John may have been using drugs and Bill may have, too.

The structure underlying (i) and (ii) is roughly represented in (iii).

(iii) $[_S$ $[_S$ John $[_{AUX}$ Pres may have-en $[_{VP}$ be-ing use drugs] $_S]$ and $[_S$ Bill $[_{AUX}$ Pres may have-en] $[_{VP}$ be-ing use drugs] too $_S]$ $_S]$

The application of *Be Shift*, *En/Ing Hopping*, *VP Deletion*, and *Tense Hopping* in successive order results in (i). If *Be Shift* does not apply to (iii), the resultant sentence is (iii).

(7) A sentence with conjoined subjects such as (ii) is assumed to be derived by *Deletion Reduction* which is *Coordinate Deletion* followed by *Deletion Reduction Convention*.

(i) *George, and I believe that Bob, take the course.

(ii) George and I believe that Bob takes the course.

(8) See Chomsky (1965, p. 144).
(9) See note to (11).
(10) This does not hold true of a sentence with conjoined subjects. See note to (7) in detail.
(11) C stands for a constituent. Given C_a^b where *a* and *b* are any integer, *a* stands for lower limit, and *b* for upper limit. Thus, the symbol "C_1^1" will stand for "one and only one constituent"; the symbol "C_1^2" for "one constituent or two constituents"; and etc. The symbol "$X \supset Y$" indicates that X contains Y. L_i is either L_1 or L_2.
(12) $\begin{bmatrix} A \\ B \end{bmatrix}$ means A and B.
(13) $\begin{Bmatrix} A \\ B \end{Bmatrix}$ means A or B.

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